

What is claimed is:

1. A method of embossing expanded graphite sheet material comprising embossing said material in an embossing atmosphere at a reduced pressure less than atmospheric pressure and maintaining a
5 reduced pressure at least during the embossing step.
2. The method of claim 1 wherein said embossing atmosphere is an inert gas.
3. The method of claim 2 wherein said inert gas is selected from the group consisting of nitrogen, helium and argon.
4. The method of claim 1 wherein said inert gas is substantially pure nitrogen.
5. The method of claim 1 further comprising continuing to evacuate gases from said embossing atmosphere during said embossing step.
6. The method of claim 1 wherein said material comprises a plurality of sheet materials comprising at least one expanded graphite sheet, and the method further comprising laminating said
5 plurality of sheet materials during said embossing step.

7. The method of claim 6 wherein said plurality of sheet materials comprises at least one sheet of metal foil.

8. The method of claim 1 wherein said reduced pressure is less than or equal to about 400 torr.

9. The method of claim 1 wherein said reduced pressure is less than or equal to about 350 torr.

10. The method of claim 1 wherein said reduced pressure is less than or equal to about 170 torr.

11. The method of claim 1 wherein said reduced pressure is less than or equal to about 50 torr.

12. The method of claim 1, further comprising puncturing at least one surface of said material prior to embossing said material.

13. A method of embossing expanded graphite sheet material comprising removing at least a portion of the gas from within said material by exposing said material to a pressure less than
5 atmospheric pressure, and then embossing said material.

14. The method of claim 13 wherein said material comprises a plurality of sheet materials comprising at least one expanded graphite sheet, and the method further comprising laminating said
5 plurality of sheet materials during said embossing step.

15. The method of claim 14 wherein said plurality of sheet materials comprises at least one sheet of metal foil.

16. The method of claim 13 wherein said reduced pressure is less than or equal to about 400 torr.

17. The method of claim 13 wherein said reduced pressure is less than or equal to about 350 torr.

18. The method of claim 13 wherein said reduced pressure is less than or equal to about 170 torr.

19. The method of claim 13 wherein said reduced pressure is less than or equal to about 50 torr.

20. The method of claim 13, further comprising puncturing at least one surface of said material prior to exposing said material to said

pressure less than atmospheric pressure.

21. An apparatus for embossing expanded graphite sheet material at a pressure less than atmospheric pressure comprising:

- (a) at least one embossing device;
- 5 (b) at least one compression mechanism adapted to urge said embossing device against said material;
- (c) an embossing chamber comprising said at least one embossing device and adapted to receive said material, and to be substantially gas-tight at least when said embossing device is urged against said material by said compression mechanism; and
- 10 (d) an evacuation mechanism for reducing the pressure within said embossing chamber.
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22. The apparatus of claim 21 wherein said at least one embossing device is a die.

23. The apparatus of claim 21 wherein said at least one pressing device is a press platen.

24. The apparatus of claim 21 further comprising an inert gas source fluidly connectable to said embossing chamber.

25. The apparatus of claim 24 wherein said inert gas is selected from the group consisting of

nitrogen, helium and argon.

26. The apparatus of claim 24 wherein said inert gas is substantially pure nitrogen.

27. The apparatus of claim 21 wherein said evacuation mechanism is capable of reducing said pressure within said embossing chamber to about 400 torr or less.

28. The apparatus of claim 21 wherein said evacuation mechanism is capable of reducing said pressure within said embossing chamber to about 350 torr or less.

29. The apparatus of claim 21 wherein said evacuation mechanism is capable of reducing said pressure within said embossing chamber to about
5 170 torr or less.

30. The apparatus of claim 21 wherein said evacuation mechanism is capable of reducing said pressure within said embossing chamber to about 50 torr or less.

31. The apparatus of claim 21 further comprising at least one sealing member associated with said embossing chamber for maintaining a gas-tight seal therein.

32. The apparatus of claim 31 wherein said
sealing member comprises at least one device
selected from the group consisting of O-rings,
bellows, compressible seals and inflatable
5 bladders.

33. The apparatus of claim 31 wherein said
sealing member comprises at least one O-ring.

34. The apparatus of claim 31 wherein said
sealing member comprises at least one compressible
seal.

35. The apparatus of claim 31 wherein said
sealing member comprises at least one inflatable
bladder.

36. The apparatus of claim 21 wherein said
at least one embossing device is a roller die.

37. The apparatus of claim 21 wherein said
at least one pressing device is a roller.

38. An apparatus for embossing expanded
graphite sheet material, said apparatus
comprising:

- 5 (a) a chamber adapted to receive said
material and to maintain a reduced
pressure less than atmospheric pressure
at least when said material is in said
chamber;

- 10 (b) an evacuation mechanism for reducing the
 pressure within said embossing chamber;
 and
 (c) at least one roller die associated with
 said chamber for receiving said material
 from said chamber.

39. The apparatus of claim 38 wherein said chamber comprises at least one resilient member extending from an interior surface of said chamber and adapted to contact said material.

40. The apparatus of claim 38 wherein said chamber comprises an upper portion and a lower portion, said upper portion comprising a plurality of resilient sealing members extending downwardly
5 therefrom, and said lower portion comprising a plurality of resilient sealing members extending upwardly therefrom, both sets of said sealing members adapted to contact said material.

41. The apparatus of claim 40, further comprising at least one feed roller for directing said material to said chamber.

42. The apparatus of claim 41 wherein said at least one feed roller is a pin roller.

43. The apparatus of claim 38 wherein said chamber comprises at least two rollers adapted to

contact a major surface of said material, such
that a substantially gas-tight seal is formed
5 therebetween.

44. The apparatus of claim 43 wherein at
least one of said rollers and said at least one
roller die are the same.

45. The apparatus of claim 43 wherein said
at least two rollers comprise at least two pair of
opposed rollers, each of said pairs of opposed
rollers adapted to contact opposing major surfaces
5 of said material.

46. The apparatus of claim 43, further
comprising at least one sealing member associated
with said chamber for maintaining a gas-tight seal
therein.

47. The apparatus of claim 46 wherein said
at least one sealing member comprises a sealing
member disposed at each end of at least one of
said rollers.

48. The apparatus of claim 46 wherein said
at least one sealing member comprises a resilient
member adapted to contact the cylindrical surface
of at least one of said rollers, such that a
5 substantially gas-tight seal is formed
therebetween.

49. The apparatus of claim 46, further comprising a resilient member adapted to contact the cylindrical surface of at least one of said rollers, such that a substantially gas-tight seal
5 is formed therebetween.

50. The apparatus of claim 45 wherein at least one of said rollers is driven.

51. The apparatus of claim 45, further comprising at least one feed roller for directing said material to said chamber.

52. The apparatus of claim 51 wherein said at least one feed roller is a pin roller.

53. An apparatus for embossing expanded graphite sheet material at a pressure less than atmospheric comprising:

- (a) means for embossing said material;
- 5 (b) an embossing chamber comprising said embossing means, and adapted to receive said material and to be substantially gas-tight at least during embossing; and
- (c) means for reducing the pressure in said
10 embossing chamber to less than atmospheric pressure.

54. The apparatus of claim 53 wherein said means for reducing the pressure in said embossing chamber reduces said pressure to about 400 torr or

less.

55. The apparatus of claim 53 wherein said means for reducing the pressure in said embossing chamber reduces said pressure to about 350 torr or less.

56. The apparatus of claim 53 wherein said means for reducing the pressure in said embossing chamber reduces said pressure to about 170 torr or less.

57. The apparatus of claim 53 wherein said means for reducing the pressure in said embossing chamber reduces said pressure to about 50 torr or less.

58. The apparatus of claim 53 further comprising means for providing an inert atmosphere within said embossing chamber.

59. The apparatus of claim 53 further comprising sealing means for maintaining a substantially gas-tight seal within said embossing chamber at least during the embossing of said
5 material.

60. An apparatus for embossing expanded graphite sheet material, said apparatus comprising:

(a) a chamber adapted to receive said

- 5 material and to maintain a reduced
pressure less than atmospheric pressure
at least when said material is in said
chamber;
- 10 (b) means for reducing the pressure in said
chamber to less than atmospheric
pressure; and
- (c) means for embossing said material.

61. The apparatus of claim 60 wherein said
means for reducing the pressure in said chamber
reduces said pressure to about 400 torr or less.

62. The apparatus of claim 60 wherein said
means for reducing the pressure in said chamber
reduces said pressure to about 350 torr or less.

63. The apparatus of claim 60 wherein said
means for reducing the pressure in said chamber
reduces said pressure to about 170 torr or less.

64. The apparatus of claim 60 wherein said
means for reducing the pressure in said chamber
reduces said pressure to about 50 torr or less.